

ROZENFEL'D, I.L.; PAVLUTSKAYA, T.I.; FRUMKIN, A.N., akademik.

New principle in the investigation of atmospheric corrosion of metals.
Dokl.AN SSSR 91 no.2:315-317 J1 '53. (MLRA 6:6)

1. Akademiya nauk SSSR (for Frumkin). (Corrosion and anticorrosives)

FRUMKIN, A.N., akademik; MIYESSEROV, K.G.

Poisoning of aluminosilicate catalysts by pyridine bases. Dokl. AN SSSR 91
no.3:553-556 J1 '53. (MLBA 6:7)

1. Institut nefiti Akademii nauk SSSR (for MiyesseroV). 2. Akademiya nauk
SSSR (for Frumkin). (Catalysts) (Aluminum silicates)

AKHUMOV, Ye.I.; SPIRO, N.S.; FRUMKIN, A.N., akademik.

Relation between concentrations of isoactive aqueous two-component solutions. Dokl.AN SSSR 91 no.3:573-576 J1 '53. (MLRA 6:7)

1. Akademiya nauk SSSR (for Frumkin).

(Solutions (Chemistry))

FRUMKIN, A.N., akademik; FORSBLOM, G.V.; MASHOVETS, V.P.

Conditions for the modeling of the electric field of electrolyzers. Dokl.
AN SSSR 91 no.3:593-595 J1 '53. (MLRA 6:7)

1. Vsesoyuznyy alyuminiyevo-magniyevyy institut (for Forsblom and Mashovets).
2. Akademiya nauk SSSR (for Frumkin).
(Electrolysis--Electromechanical analogies)

RYSS, I.G.; EL'KENBARD, A.G.; FRUMKIN, A.N., akademik.

Thermochemistry of fluo-boric complexes. Dokl.AN SSSR 91 no.4:865-868
Ag '53. (MLRA 6:8)

1. Akademiya nauk SSSR (for Frumkin). 2. Dnepropetrovskiy metallurgi-
cheskiy institut im. I.V.Stalina (for Ryss and Elkenbard). 3. Dnepro-
petrovskiy sel'skokhozyaystvennyy institut (for Ryss and Elkenbard).
(Compounds, Complex) (Boron) (Fluorine)

BELYAYEV, I.N.; BERGMAN, A.G.; NOMIKOS, L.I.; FRUMKIN, A.N., akademik.

Electric conductivity of diagonal cross sections of ternary reciprocal system in melts. Dokl.AN SSSR 91 no.5:1103-1105 Ag '53. (MLRA 6:8)

1. Akademiya nauk SSSR (for Frumkin). 2. Rostovskiy-na-Donu gosudarstvennyy universitet (for Belyayev, Bergman, Nomikos).

(Phase rule and equilibrium) (Electric conductivity)

BLOKH, G.A.; FRUMKIN, A.N., akademik.

Investigation of the mechanism of action of accelerators for rubber vulcanization. Vulcanization of rubber with sulfur isotopes. Dokl. AN SSSR 91 no. 5:1107-1110 Ag '53. (MLR 6:8)

1. Akademiya nauk SSSR (for Frumkin). 2. Kievskiy tekhnologicheskii institut legkoy promyshlennosti. (Vulcanization) (Sulfur--Isotopes)

ISAGULYANTS, G.V.; ANDREYEV, Ye.A.; KOSOLAPOVA, N.A.; FRUMKIN, A.N., akademik.

Obtaining caproic acid tagged with radiocarbon, C^{14} , in carboxyl. Dokl. AN
SSSR 91 no.5:1123-1124 Ag '53. (MLA 6:8)

1. Akademiya nauk SSSR (for Frumkin). (Caproic acid) (Carbon—Isotopes)

IOFA, Z.A.; ROZHDESTVENSKAYA, G.B.; FRUMKIN, A.N., akademik.

Measuring the adsorption of iodine ions on iron. Dokl. AN SSSR 91 no.5:1159-1162 Ag '53. (MLBA 6:8)

1. Akademiya nauk SSSR (for Frumkin).
(Adsorption) (Iodine) (Iron)

ZADUMKIN, S.N.; FRUMKIN, A.N., akademik.

Surface tension and heat of evaporation of metals. Dokl. AN SSSR 92 no.1:
115-118 S '53. (MLRA 6:8)

1. Akademiya nauk SSSR (for Frumkin). 2. Kabardinskiy gosudarstvennyy
pedagogicheskiy institut (for Zadumkin). (Metals)

GOL'DER, G.A.; ZHDANOV, G.S.; UMANSKIY, M.M.; FRUMKIN, A.N., akademik.

Radiographic determination of the structure of picryl chloride. Dokl. AN SSSR
92 no.2:311-314 S '53. (MLRA 6:9)

1. Akademiya nauk SSSR (for Frumkin). 2. Fiziko-khimicheskiy institut im.
L.Ya.Karpova (for Gol'der, Zhdanov and Umanskiy).
(Radiography) (Picryl chloride)

BORESKOV, G.K.; SLIN'KO, M.G.; FILIPPOVA, A.G.; FRUMKIN, A.N., akademik.

Catalytic activeness of nickel, palladium, platinum, in respect to the reaction of oxidating hydrogen. Dokl.AN SSSR 92 no.2:353 S '53. (MLRA 6:9)

1. Akademiya nauk SSSR (for Frumkin).
(Oxidation) (Hydrogen) (Catalysts)

FIALKOV, Ya.A.; BUR'YANOV, Ya.B.; FRUMKIN, A.N., akademik.

Complex compounds of PCl_5 with aluminum and iron chlorides. Dokl. AN SSSR 92
no.3:585-588 S '53. (MLRA 6:9)

1. Akademiya nauk SSSR (for Frumkin). 2. Institut obshchey i neorganiche-
skoy khimii Akademii nauk Ukrainskoy SSR .
(Compounds, Complex) (Chlorides)

ZAYDES, A.L.; STOYANOVA-SINITSKAYA, I.G.; FRUMKIN, A.N., akademik.

Ordered structure of films of hydrated cellulose. Dokl.AN SSSR 92 no.3:
601-602b S '53. (MLRA 6:9)

1. Akademiya nauk SSSR (for Frumkin). 2. Tsentral'nyy nauchno-issledovatel'skiy institut kozhevenno-obuvnoy promyshlennosti (for Zaydes and Stoyanova-Sinitetskaya). (Cellulose)

FRUMKIN, A.M.

Reduction of nitrate ion at the dropping mercury cathode.
A. N. Frumkin and S. I. Zhidakov. *Doklady Akad. Nauk*
USSR, 1980, 253, 32 (1980).—A current jump and a hys-
teresis loop in the polarographic reduction of the nitrate ion
(I) were observed in the presence of La^{+++} but not in that
of $\text{N}(\text{CH}_3)_4^+$ and Ca^{++} . The jump disappeared upon stir-
ring, and the reduction potential shifted with change in pH.
These effects are taken to indicate that the polarographic
reduction of I in the presence of La is catalyzed by OH^- .
Nine OH^- are formed when I is reduced to NH_3 , as substan-
tiated by the concn. ratio $\text{I}:\text{H}^+$ at conditions where the
 H -ion wave starts to appear behind the reduction wave of
the I . The exact mechanism of the OH -ion catalysis is
not clear, but it is proposed that there may exist an equill.
 $\text{NO}_2^- + \text{OH}^- \rightleftharpoons \text{HNO}_2^-$ which normally lies far at the
left but is moved somewhat to the right under the electro-
static influence of La^{+++} . Andrew Dravnieks

ZHDANOV, G.S.; ZHURAVLEV, N.N.; ZEVIN, L.S.; FRUMKIN, A.N., akademik.

Radiographic determination of the formation of solid solutions in baron carbide. Dokl.AN SSSR 92 no.4:767-768 0 '53. (MLRA 6:9)

1. Akademiya nauk SSSR (for Frumkin). 2. Moskovskiy mekhanicheskiy institut
Ministerstva kul'tury SSSR (for Zhdanov, Zhuravlev and Zevin)
(Baron carbide) (Radiography)

RYABCHIKOV, D.I.; LAZAREV, A.I.; FRUMKIN, A.N., akademik.

Chromatographic separation of molybdenum and rhenium. Dokl. AN SSSR 92 no. 4:
777-779 0 '53. (MLRA 6:9)

1. Akademiya nauk SSSR (for Frumkin). 2. Institut geokhimii i analiticheskoy
khimii im. V.I. Vernadskogo Akademii nauk SSSR (for Ryabchikov and Lazarev).
(Chromatographic analysis) (Molybdenum) (Rhenium)

USSR.

The reduction of hydroxylamine on a mercury drop electrode. S. I. Zhdanov and A. N. Frumkin. *Doklady Akad. Nauk S.S.S.R.* 92, 780-81 (1953); *Ch. Petru, C.A.* 42, 535V; *Vodrazhka, Khimiya* 2, 125 (1952).—The polarographic curves obtained for the reduction of hydroxylamine-HCl on a Hg drop electrode are discussed. The reduction was carried out in the presence of ions of various valences

((CH₃)₃N⁺, Ca⁺⁺, and La⁺⁺⁺). The curves are characterized by 2 waves. The first, which has a half-wave potential close to that of H⁺, almost disappears if an equiv. amt. of alkali is added to the soln. It is concluded that this wave is due to reduction of H⁺ which is formed by the hydrolysis of NH₂O⁺. The second wave is similar to that for NO₂⁻. It is shifted toward more pos. values as the valence on the cations is increased. On acidification this wave is shifted toward more neg. values and the addn. of alkali shifts it toward more pos. values. Both waves are diffusion-type waves. The data lead to the conclusion that the reduction occurs according to the equation: NH₂OH + H₂O + 2e⁻ = NH₃ + 2OH⁻ which, in the presence of La⁺⁺⁺, is autocatalyzed by the OH⁻ which are formed in the reaction.

J. Rortar Leach

N 32

UKSHE, Ye.A.; LEVIN, A.I.; FRUMKIN, A.N., akademik.

Effect of the adsorption of cations on electrodeposition of copper from pyrophosphate electrolytes. Dokl. AN SSSR 92 no.4:799-801 0 '53. (MLHA 6:9)

1. Akademiya nauk SSSR (for Frumkin). 2. Ural'skiy politekhnicheskiy institut im. S.M.Kirova, Sverdlovsk (for Ukshe and Levin).
(Copper--Electrometallurgy) (Pyrophosphates)

FRUMKIN, A. N.

Journal of the Iron and Steel Inst.
June 1954
Properties and Tests

B.T.R.
June - 1954

②
The Influence of Surface Active Substances on the Penetration of Hydrogen into Iron and the Mechanism of the Hydrogen Over-Potential. L. A. Dzagotakaya and A. N. Frumkin. (Doklady Akademii Nauk S.S.S.R., 1953, 68, (8), 919-922). [In Russian]. A study of the transfer of the hydrogen over-potential through an iron diaphragm with the simultaneous measurement of the amount of hydrogen diffused through it during cathodic polarization in solutions of pure 1N HCl and in the presence of an inhibitor (tetrabutylammonium sulphate with potassium bromide) is described. On additions of arsenic to the polarization cell in concentrations of 10^{-6} — 10^{-4} M, with and without the inhibitor, the change of potential under the influence of the diffusing hydrogen was not observed. This result is in opposition to the views expressed in the literature that the increased diffusion of hydrogen, observed in the presence of arsenic, is due to the slower removal of hydrogen from the diaphragm surface.—V. O.

KUZNETSOV, V.A.; KOCHERGIN, V.P.; TISHCHENKO, M.V.; POZDNYsheva, Ye.G.; FRUMKIN, A.H., akademik.

Investigation of surfaces tension of the alloy: tin - cadmium on the boundary with the fused eutectic: Li - KCl in a vacuum. Dokl.AN SSSR 92 no.6:1197-1199 0 '53. (MLRA 6:10)

1. Akademiya nauk SSSR (for Frumkin). 2. Ural'skiy gosudarstvennyy universitet im. A.M.Gor'kogo, gorod Sverdlovsk (for Kuznetsov, Kochergin, Tishchenko and Pozdnysheva). (Cadmium-tin alloys) (Surface tension)

ZHDANOV, G.S.; POSPELOV, V.A.; FRUMKIN, A.N., akademik.

Unequal length of metal oxygen bonds in certain metal oxides and the "molecular" structure ZnO. Dokl.AN SSSR 93 no.1:97-99 N '53. (MLRA 6:10)

1. Akademiya nauk SSSR (for Frumkin). 2. Fiziko-khimicheskiy institut im. L.Ya.Karpova (for Zhdanov and Pospelov). (Metallic oxides)

NOVOKHATSKIY, I.P.; KALININ, S.K.; FRUMKIN, A.N., akademik.

Fluorine content of certain natural waters of Kazakhstan according to spectral analysis data. Dokl.AN SSSR 93 no.2:289-291 N '53. (MLRA 6:10)

1. Akademiya nauk Kaz.SSR, Alma-Ata. 2. Akademiya nauk SSSR (for Frumkin).
(Kazakhstan--Water--Analysis) (Analysis--Water--Kazakhstan)
(Fluorine)

KACHURIN, L.G.; FRUMKIN, A.N., akademik.

~~Probabilities of the formation of ice nuclei in supercooled water.~~ Dokl. AN SSSR
93 no.2:307-310 N '53. (MLBA 6:10)

1. Leningradskiy gidrometeorologicheskii institut (for Kachurin). 2. Akademiya
nauk SSSR (for Frumkin). (Ice)

D'YAKOV, A.A.; FRUMKIN, A.N., akademik.

Certain problems in the electroreduction of persulfate. Dokl. AN SSSR 93 no.
4:685-687 D '53. (MLRA 6:11)

1. Akademiya nauk SSSR (for Frumkin).
(Reduction, Electrolytic) (Persulfates)

SAMSONOV, G.V.; FRUMKIN, A.N., akademik.

Physical properties of certain intrusion phases, Dokl. AN SSSR 93 no. 4:689-692 D '53. (MLRA 6:11)

1. Akademiya nauk SSSR (for Frumkin). 2. Moskovskiy institut tsvetnykh metallov i solota im. M.I. Kalinina (for Samsonov).
(Metals) (Solutions, Solid)

FRUMKIN, A.N.

USSR/ Chemistry - Physical chemistry

Card 1/1 Pub. 147 - 14/26

Authors : Mayzlish, R. S. ; Tverдовskiy, I. P.; and Frumkin, A. N.

Title : Adsorption phenomena on Hg and alcohol-water solutions of electrolytes

Periodical : Zhur. fiz. khim. 28/1, 87-101, Jan 1954

Abstract : Two series of electro-capillary curves representing ethyl alcohol - water - NaCl(sat) and ethyl alcohol - water NH₄Cl(sat) systems were measured and it became evident that the boundary tension of the aqueous salt solution decreases in the zone of electro-capillary maximum as result of introduction of alcohol into the solution. Addition of water to the alcohol salt solution leads to reduction of boundary tension on both ends of the electro-capillary curve. It was established that the negative adsorption of alcohol corresponds to the positive adsorption of water. The calculated adsorption isotherms on the boundary with air showed that both salts increased the alcohol adsorption and displace the adsorption maximum toward less concentrated alcohol solutions. Ten references : 5-USSR; 4-USA and 1-English (1913-1953). Tables; graphs.

Institution : Institute of Applied Chemistry, Leningrad

Submitted : March 14, 1953

FRUMKIN, A. N.
USSR/Chemistry

Card 1/1

Authors : Kalish, T. V., and Frumkin, A. N.

Title : Effect of anion adsorption on the reduction of an $S_2O_8^{2-}$ ion on a drop cathode

Periodical : Zhur. Fiz. Khim. 28, Ed. 3, 473-489, March 1954

Abstract : It is shown that the reaction of electro-reduction of an $S_2O_8^{2-}$ ion on a mercury electrode is retarded by the adsorbing anions. The rate of this reaction, at a positive surface charge in relation to the nature of the indifferent electrolyte, decreases gradually. The potential at which the current intensity corresponding to this reaction reaches 0.8 in proportion to the maximum diffusion current is displaced toward the negative side. At a negative surface charge one can observe a certain weakly expressed dependence of the rate of electro-reduction upon the nature of the anions which in this case are oriented in reverse sequence. The effect of adsorption anions leads to the convergence of the potential with the point of the zero-charge. Thirty references; 1 USSR, since 1919. Tables, graphs.

Institution : Acad. of Sc. USSR Institute of Physical Chemistry, Moscow

Submitted : June 11, 1953

FRUMKIN, A. N.

FRUMKIN, A. N.
USSR/Chemistry

Card 1/1

Authors : Kalish, T. V., and Frumkin, A. N.

Title : Position of the zero-charge point and its effect on the electro-reduction of a S_2O_8 anion on a drop electrode

Periodical : Zhur. Fiz. Khim., 28, Ed. 5, 801 - 805, May 1954

Abstract : Experiments showed that, the beginning of the descent of the polarization curve, during electro-reduction of S_2O_8 on a drop electrode consisting of 40% thallium amalgam, is displaced by 0.5 v toward more negative potentials, which corresponds with the position of the zero charge point of thallium amalgam. The retardation of the S_2O_8 reduction reaction over a mercury electrode in solutions containing n-octyl alcohol is determined by the absorption of alcohol molecules, the action of which is affected by the negative charges of the surface. Seven USSR references. Graphs.

Institution : Acad. of Sc. USSR, Institute of Physical Chemistry, Moscow.

Submitted : July 8, 1953

FRUMKIN, A. N.

USSR/Physics

Card 1/1

Authors : Frumkin, A. N., Academician, and Zhdanov, S. I.

Title : Origination of sudden changes in current intensity and hysteresis loop on polarization curves during electro-reduction reaction

Periodical : Dokl. AN SSSR, 96, Ed. 4, 793 - 796, June 1954

Abstract : During the reduction of NO_3^- and NO_2^- ions on a mercury drop electrode in the presence of La^{3+} , an intermittent increase in the current intensity may be observed when a certain potential is reached. The anomalous form of the polarization curves is due to the autocatalytic effect of OH^- , formed during the reduction of ions. An approximate theory of these phenomena is given. The hysteresis loop is best expressed at $\text{pH}^c = 3 - 4$ and disappears at a much higher acidification and alkalization. Three references. Graphs.

Institution : ...

Submitted : April 7, 1954

FRUMKIN, A. N.

USSR/ Chemistry - Physical chemistry

Card 1/1 : Pub. 22 - 29/48

Authors : Frumkin, A. N., Academician, and Zhdanov, S. I.

Title : Reduction of a nitrate-ion in an acid medium in the presence of La

Periodical : Dok. AN SSSR 97/5, 867-870, August 11, 1954

Abstract : The phenomena observed during the reduction of a nitrate-ion, i. e., in conditions when the reaction of the solution in the near-electrode layer cannot transform into the alkali zone because of the continuing reaction process, are discussed. The reduction of a NO_3 ion in an acid medium is followed by the reaction of H-separation. The final product of NO_3 reduction (ammonia), at pH values attainable in the presence of La^{3+} surplus, is included in the solution, basically in the form of a NH_4^+ - ion. Three references: 2-USSR and 1-Polish (1951-1954). Graphs.

Institution : ...

Submitted : June 16, 1954

A. N. FRUMKIN

51-PMF

VESTNIK AKADEMII NAUK

Journal of the Academy of Sciences
Vol 26, No. 3, March, 1956

*Phys
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Chemical Sciences Section, meeting held on December 13, 1955.

Brief summaries are given of the following two papers read at that meeting: "Review of work on adsorption phenomena at the boundary between metals and solutions applying radio-active isotopes", by A. N. Frumkin; "Work on direct investigation of the topography and the kinetic of the chemical adsorption of individual molecules and their chemical transformations in metals".

By S. Z. Roginski and I. I. Tretyakov.

PMF
PMF

Frumkin, A. N.

2000

Class ✓ Certain trends in the development of electrochemical kinetics. A. N. Frumkin. *Voprosy Khim. Kinetiki. Kataliza i Reaktivnosti*, Akad. Nauk S.S.S.R. 1955, 402-19.—Recent work on the kinetics of electrochem. reactions is reviewed to show its close connection with the general kinetics of chem. reactions in soln. 18 references.

W. M. Sternberg

PM

FRUMKIN - A. N.

450

1. Some trends in the development of electrochemical kinetics. A. N. Frumkin. *Vestnik Mosk. Univ.* 10, No. 12, Ser. Fiz.-Mat. Estim. Nauk No. 6, 7-12 (1956).—Recent work by the staff of Moscow Univ. is reviewed, with particular reference to diffusion problems, the use of rotating electrodes, elementary reaction mechanisms involving electron exchange, polarographic half-wave potentials of org.-I compds. as a function of the energy of disocn. of the R—I bond, and reactions of complex anions. C. H. F.

Phys Chem

PM

Chang Electro chemistry

FRUMKIN, A. N.

✓ 3120* Adsorption Phenomena and Electrochemical Kinetics
Adsorbtsionnye iavleniya i elektrokhimicheskaya kinetika.
(Russian.) A. N. Frumkin. Uspekhi khimii, v. 24, no. 8, 1955,
p. 933-950.

Relation of alternating current capacitance, hardness, and
external friction of metal to the potential of a metallic electrode
in sulfuric acid. Graphs, tables. 82 ref.

ph
Metal

L 5
RDW

FRUMKIN, A. N.

CH ✓ Stackelberg's theory of polarographic maxima. A. N. Frumkin. Zhar. Fiz. Khim. 29, 1315-13 (1955).—Stackelberg's theory (C.A. 49, 1363f) assumes that the ions accumulating at the base of a Hg drop are discharged, while in reality the p. ds. are kept small by the bulk elec. cond. of the soln. I. I. Bikitman

FRANK, A. N.

Electrochemical processes in systems containing hydroxy-
amines and hydroxylamines S. I. Zhurav and S. I. Zhurav

Added to 0.1M LaCl₃ + 0.005M HCl showed the
polarographic wave at a dropping Hg cathode. At greater
addition, a red wave appeared which was higher with increase
of concn. of NH₂OH. The equl. ratio (NH₂OH)/(H₂O⁺)/
(NH₄O⁺) was 10^{-4.0} in the absence of, and 10^{-4.8} in the
presence of 0.1M LaCl₃. Hence, the concn. (NH₄O⁺) of
hydroxylamine ions (in the presence of LaCl₃) was greater
than that (NH₄O⁺) of hydroxylamine ions (pH 8.5) and
smaller than (NH₄O⁺) at pH 8.5. The concn. of OH⁻
reduction of NH₄O⁺ to NH₃ was controlled by the concn.
of OH⁻ depended on the pH adjacent to the electrode. At
this pH was < 5.85, H⁺ was evolved from H₂O⁺ and the limiting
current $i = MD_1 \cdot [H_2O^+]$, D_1 being the diffusion coeff.
of H₂O⁺ and M a const. at pH > 5.85 in the vicinity of the
drop, H⁺ was evolved from both H₂O⁺ and NH₄O⁺ and $i =$
 $MD_1 \cdot [H_2O^+] + MD_2 \cdot [NH_4O^+]$, D_2 being the diffusion
coeff. of NH₄O⁺; and at pH 8, $i = 2MD_2 \cdot [NH_4O^+]$. In
the region of the reduction of NH₄O⁺ to NH₃, the polaro-
graphic wave showed a hysteresis loop because this reaction
was accelerated by OH⁻ and the concn. of OH⁻ was
increased by the reaction NH₄O⁺ + 2H₂O⁺ + 2e⁻ → NH₃.

3H₂O + La³⁺ depressed H⁺ overvoltage, and an increase in
the pH adjacent to the cathode facilitated the reduction of
La³⁺.

①

TEMKIN, M.I., FRUMKIN, A.N.

Activation energy of the hydrogen-ion discharge. Zhur.fiz.khim.
29 no.8:1513-1526 Ag '55. (MLRA 9:3)
(Hydrogen) (Electrolysis)

FRUMKIN, A.N.

USER/ Chemistry - Physical chemistry

Card 1/2 Pub. 147 - 11/21

Authors : Florianovich, G. M., and Frumkin, A. N.

Title : Electro-reduction of anions over a mercury electrode

Periodical : Zhur. fiz. khim. 29/10, 1827-1846, Oct 1955

Abstract : The reduction of numerous anions was investigated on a mercury drop and amalgamated rotating cathodes. It was found that anions begin reducing at sufficiently negative values of the potential when the electrode surface is charged negatively (relatively difficult reducible anions) and that the anion reduction begins at such potentials at which the electrode surface is positively charged (easily reducible anions). The effect of foreign cations

Institution : Moscow State University im. M. V. Lomonosov

Submitted : February 15, 1955

Card 2/2 Pub. 147 - 11/21

Periodical : Zhur. fiz. khim. 29/10, 1827-1846, Oct 1955

Abstract : on the anion reducing process was investigated and it was established that the cations affect the magnitudes of minimum currents and increase same. The effectiveness of the cations depends upon their charge and concentration. Thirty-four references: 7 Czech., 6 USA, 18 USSR, 1 Fr. and 2 Eng. (1932-1954). Table; graphs; drawing.

FRUMKIN, A. N.

4

✓ Absorption phenomena and electrochemical kinetics.
C. N. Frumkin (Acad. Sci. U.S.S.R., Moscow). *Z. Elektrochem.* 59, 807-82 (1965).—Methods for measuring
the zero-point potential corresponding to a charge-free
metal surface are reviewed and discussed. H. H. Jaffé

18
7/1/67

Frumkin, A.N.

USSR/ Chemistry - Physical chemistry

Card 1/2

Pub. 22 - 31/52

Authors : Frumkin, A. N. Academician., and Aykazyan, E. A.

Title : The kinetics of ionization of molecular hydrogen on a Pt electrode and the role of anions

Periodical : Dok. AN SSSR 100/2, 315-318, Jan 11, 1955

Abstract : Investigation was conducted to determine the relation between the current density of molecular hydrogen ionization on a disc-type smooth Pt electrode and the potential and nature of the anion at various rpm's. The hydrogen dissolved was kept in equilibrium with the hydrogen at atmospheric pressure.

Institution : The M. V. Lomonosov State University, Moscow

Submitted : October 8, 1954

Periodical : Dok. AN SSSR 100/2, 315-318, Jan 11, 1955

Card 2/2 Pub. 22 - 31/52

Abstract : It was found that the processes of ionization of adsorbed H and discharge of H ions are practically in reverse order and that the rate of the process on the whole is determined by the hydrogen adsorption and desorption stages. The effect of the anions was found to be the strongest when the electrode potentials were most positive. Ten references: 9 USSR and 1 German (1935-1952). Graphs.

FRUMKIN, A. N.

USSR/Chemistry - Electrochemistry

Card 1/1 Pub. 22 - 34/54

Authors : Frumkin, A. N., Academician; Kaganovich, R. I.; Gerovich, M. A.; and
 Vasilyev, V. N.

Title : The mechanism of anodic formation of persulfates

Periodical : Dok. AN SSSR 102/5, 981-983, Jun 11, 1955

Abstract : Sulfate electrolysis experiments were carried out in water enriched with the heavy O^{18} isotope, in alkali and weak acid electrolyte at possibly low temperatures to establish the condition most favorable for the anodic formation of persulfates. The results indicate that the first product formed on the anode is an oxygen-containing water-oxidation compound OH which in turn oxidizes the SO_4^{2-} ion within the volume of the solution. Seven references: 3 USSR, 3 USA and 1 German (1922-1954). Table.

Institution : Acad. of Sc., USSR, Inst. of Phys. Chem. and the M.V. Lomonosov State University, Moscow

Submitted : April 11, 1955

FRANKIN, D.N.

✓ The history of the department of electrochemistry at Moscow State University. A. H. Frumkin, L. A. Isaacs, A. Kiselevich, and A. I. Potapov. *Chemical Abstracts*, 1961, 56:111-112 (1961). A historical review and a discussion of work now in progress. The latter includes studies of potential differences on the surface of liquids which are carried on a long & thin; the structure of the surface layer of pure water, and of dil. salt and concd. acid solns.; the elec. properties of substituted fatty acids and the adsorption of ions on fatty acid monolayers; and the spreading of nonpolar org. compounds on the surface of electrolytes. C. H. Puckham

FRUMKIN, A. N.

USSR/General Problems - Methodology. Scientific Institutions
and Conferences. Instruction. Questions Concerning
Bibliography and Scientific Documentation.

A-1

Abs Jour : A.N. Frumkin.

Inst :

Title : In Memory of a Scientist and Revolutionist.

Orig Pub : Khim. nauka i prom-st', 1956, 1, No 5, 573-574

Abstract : To the 10th anniversary of the death of A.N. Bakh
(1857 - 1946).

Card 1/1

- 4 -

TEMKIN, M.I.; FRUMKIN, A.N.

On the paper by O.M.Pelterak "The activation energy of hydrogen ion discharge and the problem of absolute potential in electrochemical kinetics". Zhur.fiz.khim.30 no.5:1162-1168 My '56.
(MIRA 9:9)

(Hydrogen) (Potential, Theory of) (Pelterak, O.M.)

FRUMKIN, A.N.; IOFA, Z.A.; GEROVICH, M.A.

Potential difference at the water - air interface [with English
summary in insert]. Zhur.fiz.khim. 30 no 7:1455-1468 J1 '56.
(MLRA 9:11)

1. Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova.
(Electrochemistry) (Potential, Theory of)

FRUMKIN, A. N.

B-12

Category: USSR / Physical Chemistry - Electrochemistry.

Abs Jour: Referat Zhur-Khimiya, No 9, 1957, 30132

Author : Temkin M. I., Frumkin A. N.

Inst : not given

Title : Comments on the Dependence of Hydrogen Overvoltage on Nature of the Cathode in Connection with the Paper by Ryuchi and Delae (Ryutshi and Delakhey in the Original).

Orig Pub: Zh. fiz. khimii, 1956, 30, No 8, 1885-1888

Abstract: A discussion article (RZhKhim, 1956, 12527); see also RZhKhim, 1956, 54066.

Card : 1/1

-10-

FRUMKIN, A. N.,

"A Contribution to the Overvoltage Theory of Hydrogen," Zeitschrift Fuer
Physikalische Chemie," (Periodical of Physical Chemistry), October 1957.

YAKOBI, B.S.
YAKOBI, B.S.; FRUMKIN, A.N., akademik, red.; SMIRNOVA, A.V., tekhn.red.

[Work on electrochemistry; a collection of articles and papers]
Raboty po elektorkhimi; sbornik statei i materialov. Pod red.
A.N.Frumkina. Moskva, Izd-vo Akad.nauk SSSR, 1957. 301 p.
(Electrochemistry) (MIRA 11:2)

FRUMKIN, A. N.

Adsorption of organic substances at the metal electrolyte
solution interface and its influence on electrochemical processes.
Academy of Science, USSR, Physical Chemical Laboratory of Surface
Phenomena, Moscow, U.S.S.R.

A paper to be presented at the 2nd International Congress of Surface
Activity London, April 1957

FRUMKIN, A.
Moscow

"Passivierung von Platin in Bezug auf Oxydationsvorgänge in der
Lösung" a paper submitted to the International Symposium on Passivity of Metals,
2-7 Sep 57, Darmstadt, Germany.

C-3,800,126

From K: N: A: N

Significance of electrochemical methods in the determination of surface properties of compounds. A. N. Frumkin (M. V. Lomonosov State Univ., Moscow). *Trudy Khim. Nauk, 6* (I) v. *Uchenye Zapiski Akad. Nauk SSSR, Seriya Khim. Nauk*, 1957, 33-8. (A discussion of the significance of electrochemical methods in the determination of surface properties of compounds.)

FRUMKIN, A. N.

Distr: 4E4j

General questions of electrochemical kinetics and the theory of ionic reactions. ⁷ A. N. Frumkin. Izvest. Akad. Nauk S.S.S.R., Otdel. Khim. Nauk 1957, 1429-38.—A review illustrating the relation between the electrochem. kinetics and the kinetics for ionic reactions that take place in soln. 42 references. J. Rovtar Leach

3
1

PM

FRUMKIN, A.N.
FRUMKIN, A.N.

The scientific work of A.N. Bakh. and its role in the development of physical chemistry in the USSR. Izv.AN SSSR. Izv.AN SSSR. Otd.khim.nauk. no.7:776-781 J1 '57. (MIRA 10:10)
(Bakh, Aleksei Nikolaevich, 1857-1946)
(Chemistry, Physical and theoretical)

FRUMKIN, A.M.

Discussion. Probl. kin. i kat. 9:276-277 '57.
(Anions)

(MIRA 11:3)

Frumkin, A. N.

30-10-13/26

AUTHOR: Frumkin, A. N., Academician

TITLE: Tasks of the Institute of Electrochemistry
(Zadachi instituta elektrokhimii).

PERIODICAL: Vestnik AN SSSR, 1957, October, Nr 10, pp. 99-101 (USSR)

ABSTRACT: The electrochemistry has to solve a series of great tasks within the sixth Five-year Plan. The AS USSR decided therefore to organize within its scope proper institutes of electrochemistry.
The problems set to these institutes can be characterized as follows:

- 1) Enlarging of the theoretical electrochemistry in order to clarify especially the question of electrochemical kinetics and thermodynamics.
- 2) Obtaining of new chemical sources of current which satisfy severest service conditions without relaxing.
- 3) Obtaining of new secondary electrochemical sources of current from atomic energy.
- 4) Determination of the phenomena occurring between semiconductors and electrolytic solutions.
- 5) Clarification of the processes at the primary and secondary electron emission correlated with the presence

Card 1/2

Tasks of the Institute of Electrochemistry

30-10-13/26

- of contact potentials at the limits between metals and semi-conductors.
- 6) The possibilities of electrolysis on a large technical scale should be studied in connection with the construction of new large electric power plants.

AVAILABLE: Library of Congress

Card 2/2

FRUMKIN, A.N.; NIKOLAYEVA-FEDOROVICH, N.V.

Electric reduction of anions and adsorption of cations. Vest. Mosk.
un. Ser. mat.mekh. astron. fiz. khim. 12 no.4:169-184 '57.
(MIRA 11:5)

1.Kafedra elektrokhimii Moskovskogo gosudarstvennogo universiteta.
(Electrochemistry) (Anions) (Cations)

62-12-2/20

AUTHOR: Frumkin, A.N.

TITLE: On Some General Problems of the Electrochemical Kinetics and the Theory of Ion Reactions (O nekotorykh obshchikh voprosakh elektro-khimicheskoy kinetiki i teorii ionnykh reaktsiy)
Report Delivered at the Meeting of the Chemical Department of the AN USSR on October 31, 1957 (Doklad na sessii otdeleniya khimicheskikh nauk Akademii nauk SSSR, 31 oktyabrya 1957 g).

PERIODICAL: Izvestiya AN SSSR Otdeleniye Khimicheskikh Nauk, 1957, Nr 12, pp. 1429-1438 (USSR)

ABSTRACT: The reviewer distinguishes between three stages in the development of modern chemistry; in his report, however, he deals with the last stage, i.e. the development of electrochemical kinetics. The basic condition was to penetrate more deeply into the metal-electrolyte boundary structure. The results achieved are described as very modest. It is further said that a number of new physical methods of investigation are applied. The author then deals with the adsorption of gases on the surface of solid metals. The determination of the dependence of the velocity of the heterogeneous chemical process on the pressure of the gases taking part in the reaction requires knowledge of the isothermal lines of adsorption of the surfaces of the catalyst.

Card 1/3

On Some General Problems of the Electrochemical Kinetics
and the Theory of Ion Reactions. Report Delivered at the
Meeting of the Chemical Department of the AN USSR on
October 31, 1957

62-12-2/20

For this purpose in most cases the isothermal lines of adsorption according to Langmuir (Langmuir) were used. Measurements, which were carried out last by Shlygin, Ershler and the author between 1929 and 1938, led to the unexpected conclusion that the quantity of hydrogen adsorbed on platinum is linearly modified in first approximation (see formulae p. 1431). The author then deals with the electric capillary phenomena and anomalous properties of thin layers of liquids. After describing the hitherto distinguished 2 kinds of transition (from the adsorbed layer to the new phase), the author mentions the results obtained recently by Dyrugin and his collaborators: he was able, by means of optical measurements, to show that by approximation to the point of saturation the strength of the adsorbed layers of polar liquids (as e.g. of water and of alcohol) on the smooth surface of glass actually attains some dozen molecules (up to 100 Å). The author dealt in detail with the result of the investigation of the ratio between the electrode processes and the ion reactions in solvents (see fig. 1). Independent of the conception formed of the participation of the adsorbed anions in the elementary

Card 2/3

On Some General Problems of the Electrochemical Kinetics
and the Theory of Ion Reactions. Report Delivered at the
Meeting of the Chemical Department of the AN USSR on
October 31, 1957

62-12-2/20

process, there is no doubt that they form little bridges (mostiki),
which connect the electrode with the cation [23]. There are
3 figures and 42 references, 33 of which are Slavic.

ASSOCIATION: Institute for Physical Chemistry of the AN USSR (Institut
fizicheskoy khimii Akademii nauk SSSR).

SUBMITTED: October 1, 1957

AVAILABLE: Library of Congress

Card 3/3 1. Chemical engineering-Conference 2. Gas-Adsorption-Metals
3. Electrochemical kinetics

FRANKLIN, A. N.

7 4-

✓ The electroreduction of anions. A. N. Frankin and N. V. Nikolajeva (Inst. Phys. Chem., Acad. Sci. Moscow, U.S.S.R.), *J. Chem. Phys.* 26, 1552 (1957) - The criticism of the theory of Florjanovich and Frumkin (*C. A.* 50, 6212g) by Kivale and Laitinen (*C. A.* 50, 2318e) was answered. The electroreduction of anions is often strongly influenced by the electronic charge on the surface of the metallic electrode, and this influence can be traced to the influence of the charge on the compn. of the elec. double layer. Neutral mol. coord. coordinated Cl behave with respect to electroreduction much like anions because the Cl assists in the adsorption of the mol. and this adsorption is charge sensitive. In all cases the difference in the mechanism of the electroreduction of anions or of neutral particles with anionic groups at different potentials can be interpreted as detd. by differences in the conditions of adsorption of the reacting particles.

Henry Leidhefer, Jr

Bm

FRUMKIN, A.N., akademik

Tasks of the Institute of Electrochemistry. Vest. AN SSSR [27]
no.10:99-101 0 '57. (MIRA 10:10)
(Electrochemistry--Research)

AUTHOR: Frumkin, A. N. 30-11-18/23
 Frumkin, A. N., Member of the Academy.

TITLE: Meetings with Polish and German Chemists (Vstrechi s pol'skimi i nemetskimi khimikami)

PERIODICAL: Vestnik AN SSSR, 1957, Vol. 27, Nr 11, pp. 122-128 (USSR)

ABSTRACT: After Polish electrochemists had paid a visit to the Institute for Physical Chemistry AN USSR the author stayed in Warsaw as a guest of the Polish Academy of Science. The research works in the field of electrochemistry are concentrated in the Institute for Physical Chemistry under the direction of the eminent scientist V. Sventoslavskiy. The Smyalovskiy-Laboratory (physical chemistry of electrode-processes) is on a very high scientific level; the investigations of the dependence of the penetration of hydrogen on the composition of various admixtures in steel, such as oxygen, sulphur, phosphor, are carried out on a broad basis. The collaborator B. Baranovskiy succeeded in discovering some new effects of motion of the liquid upon the passage of current. Pure calculation works on various problems of quantum-chemistry are done in the Laboratory S.Mintsa by theoretical physicists (the students of the well-known physicist L.Infel'd). The Laboratory for Physico-Chemical Methods of Analysis (under the direction of

Card 1/3

Meetings with Polish and German Chemists.

30-11-18/23

V.Kemul') which is connected with the chair for anorganic analytical chemistry of the Warsaw University, is distinguished by a special many-sidedness and topicality of themes. A method for determining minute traces of admixtures in metals was worked out in this laboratory. Much work is also devoted to the investigations of the mechanism of electrode-processes. Thus, for example, a marked breaking of the electrode-processes by absorbed foils of the hydroxidation was determined. In the Laboratory B.Kamenskogo the investigation of the potentials on the free surface of various solutions is successfully performed. The aim of these works is a comparison of these potentials with the physiological activity of organic compounds. Many works are distinguished by special originality. -Then the author reports on his impressions during the visit of the scientific research institutes in the DDR (GDR). He participated in the Berlin Colloquy on the kinetics of electrode-processes. K.Shvabe (Dresden), chairman of the organization-committee, talked on the theory of the overvoltage of hydrogen. M.Brayter (Munich) reported on the investigation of the anode-formation and the cathode-restoration of the surface-oxidations on electrodes of noble metals in acid solutions. Of special interest for the author was the detailed exchange of opinions in a

Card 2/3

Meetings with Polish and German Chemists.

30-11-18/23

small circle on the most important still unsolved problems of electrochemical kinetics. In the technical college in Dresden the author held a lecture on "The restoration of anions in an electrical manner and the adsorption of cations" and in the Academia Leopoldina in Halle he talked on "The adsorption of organic substances on the boundary metal-solution and its influence upon the electrochemical processes."

AVAILABLE: Library of Congress

Card 3/3

FRUMKIN, A. N.
USSR/Physical Chemistry - Electrochemistry

B-12

Abs Jour : Referat Zhur - Khimiya, No 1, 1958, 560

Author : A.N. Frumkin, A.S. Titiyevskaya.

Inst :

Title : Electrocapillary Phenomena in Solutions of Thallium Salts.

Orig Pub : Zh. fiz. khimii, 1957, 31, No 2, 485-492

Abstract : Electrocapillary curves (EC) for the solutions 1 n. H_2SO_4 + x n. Tl_2SO_4 (x = 0.01; 0.05; 0.1 n.) and 1 n. KNO_3 + 0.01 n. HNO_3 + x n. $TlNO_3$ (x = 0.01; 0.1 and 0.2 n.) were plotted in the region of the polarization of the Hg electrode from +0.1 to -0.45 v (satur. c. e.). A drop of the boundary tension was revealed at the maxima of the curves, as well as a shift of these maxima in the positive direction, which reached 0.29 v in the case of the solution 0.2 n. $RlNO_3$. A little surface activity of Tl^+ ions was revealed also at positive charges of the Hg surface. The conclusion was made that Tl^+ behaves as a typical

Card 1/2

Elect. Phys. Chem. AS USSR, Moscow

USSR/Physical Chemistry - Electrochemistry.

B-12

Abs Jour : Ref Zhur - Khimiya, No 1, 1958, 560

surface tension lowering cation. A detailed thermodynamic analysis was carried out; it showed that this conclusion did not disagree with the conclusion concerning the adsorption of atomic Tl on the boundary between the Tl amalgams and solutions not containing Tl ions (Frumkin A.N., Gorodetskaya A.V., Z. phys. Chem., 1928, 136, 451). It was assumed that not only simple, but also complex Tl⁺ ions can participate in the adsorption process.

Card 2/2

FRANKIN P. N.

Investigation of electrolytic hydrogen evolution on the addition of atomic hydrogen to the electrode surface. Frankin (Inst. Phys. Chem. Acad. Sci. USSR, Ser. Khim. 31, 1965, pp. 1-10).
 changes of the H-overvoltage η in stationary electrolytes containing small amounts of Levina and Kabanov (C.A. 51, 860a, 1954), when atomic hydrogen is introduced to the cathodic surface. When H₂ is introduced to a uniform electrode surface by an electrochemical desorption mechanism at low η values, an increase in η is to be expected if the surface coverage with adsorbed H₂ under stationary electrolysis conditions, θ , is increased with a rise in the η values. At high η values at H₂ must reduce η when θ remains below some definite value. With a recombination mechanism the elimination of at H₂ must always increase η , and at small η values the increase must be inversely proportional to the exchange current of the recombination stage. The conclusions were compared with experimental results in the literature.

W. M. Sharsharov

FRUMKIN, A.N.
IOFA, Z.A.; FRUMKIN, A.N.; MAZNICHENKO, E.A.

Effect of the nature of cations on the rate of hydrogen
separation from alkaline solutions [with summary in English].
Zhur.fiz.khim. 31 no.9:2042-2051 S '57. (MIRA 11:1)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.
(Cations) (Hydrogen) (Solution (Chemistry))

Frumkin, A.N.

20-4-33/60

AUTHORS

Frumkin, A.N., Academician
Damaskin, B.B., Nikolayeva-Pedorovich, N.V.

TITLE

The Super-equivalent Adsorption of Cations on a
Negatively Charged Mercury Surface.
(Sverkhkvivalentnaya adsorbtsiya kationov na otritsatel'no
zaryazhennoy poverkhnosti rtuti.)

PERIODICAL

Doklady Akademii Nauk SSSR, 1957, Vol. 115, Nr 4,
pp. 751-754 (USSR)

ABSTRACT

In a demonstration of electrocapillarity it is usually
assumed that among the anorganic ions only the anions
possess a specific adsorbability; that the concentration
of the anorganic cations in an electric double layer is
only determined by the quantity of their charges. But there
exist published data which point to the inaccuracy of such
a conclusion. A direct conclusion on the different ad-
sorbability of the cations of alkaline metals in solutions
of 0,1 N - chlorides becomes clear from Grahame's paper
who determined the precise values of the differential
capacity of the latter. His conclusions are in bad agreement
with experimental data. In order to avoid contradictions
in the interpretation of test results, it is simpler to
assume a certain, although not large, cation adsorption

CARD 1/5

20-4-33/60

The Super-Equivalent Adsorption of Cations on a Negatively Charged Mercury Surface.

with a larger radius. The study of the temperature coefficient of the reaction of electric anion reduction leads to the same conclusion. Measurements of the differential capacity in 0,01 N- chloride solutions of alkaline metals were performed, in order to check the guess of the specific cation adsorption. A pendent mercury drop served as test electrode. The obtained results are given in tab. 1 A. The curves concern the differential capacity in 0,01 N- solutions of lithium, potassium and cesium chlorides. A difference in the capacity for cations with various radii is here not only observed in the case of considerable negative potentials, but also close to the zero-charge point where a minimum occurs on the curves. A difference in the capacity values of lithium and cesium chloride solutions furnishes an additional indication concerning the specific adsorption of the cesium cation.

CARD 2/5

20-4-33/60

The Super-Equivalent Adsorption of Cations on a Negatively Charged Mercury Surface.

This conclusion may, however, not be considered as unequivocal, since the data are in such solutions complicated by the Cl^- adsorption. The most convincing data concerning the super-equivalent cation adsorption may be obtained by measurements of the differential capacity on negatively-charged electrode surfaces in the presence of such an anion, as e.g. J^- , whose adsorption in the surface layer markedly influences the value of the differential capacity. Such measurements are performed by the authors in 0,1 N solutions of

NaCl , NaJ , CaCl_2 , CaJ_2 , as well as in 1,1 N solutions of KCl , 1 N KJ + 0,1 N KCl , 1 N KCl + 0,1 N LaCl_3 and 1 N KJ + 0,1 N LaCl_3

The data are given in fig. 1 B and 2 A. From them follows that in the case of sufficiently negative polarizations

CARD 3/5

20-4-33/60

The Super-Equivalent Adsorption of Cations on a Negatively Charged Mercury Surface.

the iodine anion stops to exert an influence, and the values of the differential capacity for the corresponding chlorides and iodides are in agreement. In the case of still stronger negative potentials the capacity values are only determined by the cations present in the solution. But the potentials at whom the difference between the capacity values of the corresponding chlorides and iodides disappears are not equal and depend on the nature of the cation. As may be seen from fig. 1 B and 2 A, in the case of more negative potentials the capacity in the presence of Cs^+ or La^{+++} in connection with the penetration of anions into the electric double layer suddenly increases as compared to Na^+ or K^+ . The fact that the superequivalent adsorption of cations may lead to the penetration into the surface layer also in the case of negative potentials, becomes especially obvious in the adsorption of organic cations. Fig. 2 B gives data concerning the dependence of the differential capacity in 1 M solutions of KCl , KBr and KJ in the presence of $10^{-5} \text{ N}(\text{C}_4\text{H}_9)_4^{+} 2\text{SO}_4^{-}$.

CARD 4/5

CARD 5/5

Frumkin, A. N.

20-1-27/42

AUTHOR: Frumkin, A. N., Academician

TITLE: On the Difference of the Potentials and the Accumulation of the Components of the Solution in the Diffusion Layer During Steady Electrolysis (O raznosti potentsialov i nakoplenii sostavnykh chastei rastvora v diffuzionnom sloye pri statsionarnom elektrolize)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 117, Nr 1, pp. 102-105 (USSR)

ABSTRACT: The present report attracts attention to some peculiarities of the distribution of concentration and the potential in a diffusion layer during steady electrolysis. The author first investigates the case of the steady electrolysis of a binary electrolyte with any concentration which consists of a discharging cation with the valence n_1 and a not discharging anion with the valence n_2 . For the difference of the potentials between a point on the surface of the electrode and a point in the center of the solution it holds that

$$\Phi = (RT/n_2 F) \ln(a_2''/a_2').$$

Card 1/3 However, the value of a_2''/a_1' cannot be determined from this formula, because not Φ , but only $\Phi + \Delta\varphi$ can be determined

On the Difference of the Potentials and the Accumulation
of the Components of the Solution in the Diffusion Layer
During Steady Electrolysis 20-1-27/42

by measuring. Here $\Delta\varphi$ denotes the modification of the potential difference φ between electrode and solution as a result of the change of concentration in the layer near the electrode. Next, the expression for $\bar{\varphi} + \Delta\varphi$ which corresponds to the above formula, is written down. The measurable quantity $\bar{\varphi} + \Delta\varphi$ is expressed not by the average but by the individual activities of the individual ions. It would be of great interest to apply the equation for $\bar{\varphi} + \Delta\varphi$ the concentrated solutions, as e.g. acids. The author first investigates the case of a diluted acid which contains a cation 1, discharging on the cathode with the valence n_1 and the concentration c_1 (in equivalents per cm³) as well as a not discharging anion 2 and a not discharging cation 3 with the valences n_2 and n_3 and the concentrations c_2 and c_3 . Because of the condition of electric neutrality it holds that $c_1 + c_3 = c_2$. Next, relations between the concentrations of the not discharging ions on the surface of the electrode (c_2'' , c_3'') and in the interior of the

Card 2/3

On the Difference of the Potentials and the Accumulation of the Components of the Solution in the Diffusion Layer During Steady Electrolysis 20-1-27/42.

solution outside the double layer during steady electrolysis are given. At $c_1/c_3 = 10^4$, $n_3 = 3$ and $n_2 = 1$ the degree of enrichment of the not dissolving cation is 10^3 . The practical applicability of such an enrichment process is, however, limited. However, the analytical applications of such an enrichment are real. In conclusion the author illustrates the relations between the total and the "ohmic" decrease of the potential in a diffusion layer on the basis of an electrolyte with three ions. There are 3 references, 2 of which are Slavic.

SUBMITTED: July 30, 1957

AVAILABLE: Library of Congress

Card 3/3

FRUMKIN, A.N.
AUTHOR: Frumkin, A.N., Academician

25-1-8/48

TITLE: Fuel Element (Toplivnyy element)

PERIODICAL: Nauka i Zhizn', 1958, # 1, p 17 (USSR)

ABSTRACT: The author, one of the leading Soviet electrochemists, recommends that research on the fuel element be intensified, e.g. the composition of highly efficient high temperature gas elements be studied and experiments with high temperature elements which make use of solid electrolytes with good conducting qualities be carried out. The discovery of such an electrolyte, where the transmission of current is carried out completely by oxygen anions, would represent a remarkable achievement in this field of science.

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Card 1/1

FRUMKIN, A.N., akademik; LUKOVTSSEV, P.D., doktor khim. nauk

~~Present~~ Present state of knowledge of the mechanism of electrode processes.

Khim. nauka i prom. 3 no.4:410-417 '58.

(MIRA 11:10)

(Chemical reaction, Rate of) (Electrochemistry)

FRUMKIN, A.M.

AUTHOR: None given

62-58-4-30/32

TITLE: Anniversary Session of the Department
for Chemical Sciences of the AS USSR on October 30 and 31,
1957, and General Meeting of the Department for Chemical
Sciences on December 19 and 20, 1957 (Yubileynaya sessiya
otdeleniya khimicheskikh nauk Akademii nauk SSSR ot 30-31
oktyabrya 1957 g. i obshcheye sobraniye otdeleniya khimicheskikh nauk 19-20 dekabrya 1957 g.)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Khimicheskikh Nauk,
1958, Nr 4, pp. 521 - 524 (USSR)

ABSTRACT: On the occasion of the 40th anniversary of the October
Revolution a reunion meeting of the Department for Chemical
Sciences of the AS USSR took place. In his opening speech
N. N. Semenov pointed out the outstanding success of the USSR
in the field of sciences especially in that of chemistry.
Scientific lectures of the sessions were held by the following
scientists, as was mentioned already earlier: Knunyants,
Member, Academy of Sciences, and A. V. Fokin on the "Nitration
of Fluorofines", A. L. Midzhoyan, Member, AS Armenian SSR,

Card 1/4

62-58-4-30/32

Anniversary Session of the Department for Chemical Sciences of the AS USSR on October 30 and 31, 1957, and General Meeting of the Department for Chemical Sciences on December 19 and 20, 1957.

on the "Investigations in the Field of the Synthesis of Physiologically Active Compounds", R. Kh. Freydlina, Doctor of Chemical Sciences, reported on the "Investigation of the Telomerization Reaction and the Reaction of the Synthesis on the Basis of Telomers" (Reference 2). B. A. Dolgoplosk, Doctor of Chemical Sciences, spoke on the "Generation of Free Radicals in Solutions and Their Reactions in Model Systems," A. M. Frumkin, Member of the Academy of Sciences, reported on "Some General Problems of Electrochemical Kinetics and the Theory of Ion Reactions" (Reference 4), A. V. Kiselev, Doctor of Chemical Sciences (Reference 5) spoke on "Some Problems of Adsorption Theory", N. M. Emanuel (Reference 6), Doctor of Chemical Sciences, reported on "New Problems in the Field of Chain Reactions", V. L. Tal'roze, Candidate of Chemical Sciences, spoke on mass-spectroscopic investigations of ion- and radical reactions, A. P. Rebinder, Member,

Card 2/4

62-58-4-30/32

Anniversary Session of the Department for Chemical Sciences of the AS USSR on October 30 and 31, 1957, and General Meeting of the Department for Chemical Sciences On December 19 and 20, 1957

Academy of Sciences, drew conclusions with regard to the development of physico-chemical mechanics(Reference 7).

I. V. Tananayev, Corresponding Member of the AS USSR, gave new data on the chemistry of some rare elements, D. I.

Ryabchikov and others spoke on the "Problems of the Chemistry of Rare Earth Elements"; the final lecture was that of V. A. Sokolov, Doctor of Chemical Sciences, on the "Calorimetric Measurements at High Temperatures".

General Regular Meeting of the Department for Chemistry of the AS USSR (December 19 - 20, 1957): A. I. Brodskiy, Corresponding Member, AS USSR, spoke on the "Investigation of Some Reactions of Peroxides and Peracids of Hydrogen by Means of the Isotopic Method", M. M. Shemyakin, Corresponding Member, AS USSR, spoke on the "Use of N15 for the Explanation of the Mechanism of Some Organic Reactions", O. A. Reutov, Doctor of Chemical Sciences, reported on the "Investigation of the

Card 3/4

62-58-4-30/32

Anniversary Session of the Department for Chemical Sciences of the AS USSR on October 30 and 31, 1957, and General Meeting of the Department for Chemical Sciences On December 19 and 20, 1957

Electrophil and Homolytical Reactions of the Substitution in the Carbon Atom by Means of the Method of Isotope Exchange", I. P. Alimarin, Corresponding Member, AS USSR, reported on new methods of determination of the division of rare elements using organic derivative sulfuric-, selenic- and telluric acids, V. G. Levich, Doctor of Chemical Sciences, reported on the "Diffusion Kinetics of Heterogenous Chemical Reactions in mobile Liquids". There are 8 references, all of which are Soviet.

AVAILABLE: Library of Congress

1. Chemical industry—USSR

Card 4/4

FRUMKIN, A. N.

76-1-24/32

AUTHORS: Frumkin, A. N. , Polyanskaya, N. S.

TITLE: Electrocapillary Phenomena in Salt Solutions of Thallium and Cadmium II. (Elektrokapillyarnyye yavleniya v rastvorakh soley talliya i kadmiya. II.)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 1, pp.157-163 (USSR)

ABSTRACT: Anomalous electrocapillary curves in thallium salt solutions. In the earlier works of the authors (reference 1) experimental results of the electrocapillary mercuric curves of solutions with thallium salts were given. The measurements were continued up to the potential $\varphi = -0,45$ with a normal calomel electrode. By this, the current passage through the solution in the capillary of the capillary-electrometer could be determined. On occasion of a control measurement carried out according to the method described in reference 1 with lightly acidulated $0,2 \text{ N TlNO}_3 + 0,8 \text{ N KNO}_3$, it was shown that these measurements can be continued up to more negative potentials (N - normal). By this, a capillary curve of a strange form - with two maxima - was obtained. It is shown that in this case actually two electrocapillary curves belonging to different systems are measured in experiment. The curve situated at the left is, as this is shown in the first part of this work, the electrocapillary

Card 1/4

76-1-24/32

Electrocapillary Phenomena in Salt Solutions of Thallium and Cadmium.II.

mercury curve of the thallium salt solution. Furthermore, it is shown that the right part of the two-humped curve shows the electrocapillary curve of the Tl-analgram with constant composition in a $\sim 0,9N$ KNO_3 solution. It is shown that at $\varphi \leq -0,582$ with an accuracy of up to 10 % the composition of the amalgam forming in the capillary of the electrometer remains constant, whilst the concentration of the Tl^+ ions decreases at least by the tenfold, i.e. up to 0,02 N. At $\varphi = -0,642$ the boundary value of c_{Tl}^s (concentration of thallium in amalgam at the boundary with the solution) is obtained with an accuracy of up to 1 %, whilst the c_{Tl}^+ value (concentration at the boundary with mercury) decreases up to 0,002N. The descending branch of the electrocapillary curve of the Tl-analgram is near to that of the $N KNO_3$, except it is displaced somewhat to the negative side. In the reference 2 of one of the authors it is shown that the boundary-stress must increase by $\sim 0,5$ dyn/cm in a solution of equal composition at potentials being more negative than $\varphi = -1,1$ on occasion of the conversion from mercury to 0,45 % of amalgam. This fact corresponds to an average displacement of the descending branch by 3,5 mV in the direction towards the more negative potentials. This displacement is subjected to two further effects. The conditions for the arising of these effects will become clear, if the potential decrease and the quantity of

Card 2/4

76-1-24/32

Electrocapillary Phenomena in Salt Solutions of Thallium and Cadmium. II.

the concentration variations produced on occasion of the current passage through the capillary are determined. If all these effects are summed up it can be seen that the descending branch of the electrocapillary curve $0,2N\ TlNO_3 + 0,8N\ KNO_3$ in comparison to the same branch of $N\ KNO_3$ solution must displace itself by $\sim 2,7 + 2,7 + 3,5 = 9\ mV$ to the negative side. The displacement observed on occasion of the experiment amounted to about $10\ mV$. The electrocapillary phenomena in cadmium salt solution. As it was shown by A. N. Frumkin and F. Servis (reference 3) the point of the zero-charge of the cadmium amalgam in KCl -, KBr - and KJ -solutions displace itself, as in the case of thallium salts into the direction of the more negative potentials. This was also confirmed by the measurements of the electrocapillary curves of the amalgam by A. V. Gorodetskaya. It is shown that the total curve obtained on occasion of the measurement of the dependence of the boundary-stress of mercury upon the polarization in the $2,0N\ KBr + 0,5N\ CdBr_2$ -solution distinctly consists of two electrocapillary curves. The left one is to be considered as the general electrocapillary curve of mercury in the solution mentioned, whilst the right curve has to be taken for a electrocapillary curve of cadmium amalgam in the KBr -solution. Analogous results were obtained with the $0,8N\ KBr +$

Card 3/4

76-1-24/52

Electrocapillary Phenomena in Salt Solutions of Thallium and Cadmium. II.

+ 0,2N CdBr_2 -solution, whilst in the case of the 0,0N Na_2SO_4 +
+ 0,2N CdSO_4 -solution a salient point in the total ζ - ϕ -curve
could not be found. It is assumed that in this system the surface
activity, as well of the Cd^{2+} -ion in the solution, as of the Cd
dissolved in mercury, is much too small. There are 5 figures, and
6 references, all of which are Slavic.

ASSOCIATION: AS USSR. Institute of Physical Chemistry. Moscow
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SUBMITTED: November 5, 1956

AVAILABLE: Library of Congress

Card 4/4

AUTHORS:

Frumkin, A.N.
Frumkin, A. N., Academician
Tedoradze, G. A.

20-3-32/59

TITLE:

The Ionisation Kinetics of Molecular Chlorine
(Kinetika ionizatsii molekulyarnogo khloro)

PERIODICAL:

Doklady AN SSSR, 1958, Vol. 118, Nr 3, pp. 530-533 (USSR)

ABSTRACT:

The authors investigated the kinetics of the electric reduction of chlorine on a rotating disk-shaped platinum electrode. The surface area of the electrode was 0,78 mm². The chlorine was produced by electrolysis of 15- per cent HCl and washed by letting it pass through the solution in test. The electrode to be investigated was activated before the experiment. The performance of the experiment is described shortly. At not very high excess voltages the amperage of the ionisation current for chlorine depends on the fact, whether the voltage changes from the more anodic potentials to the more cathodic ones or vice-versa. A limiting value of the amperage of the ionisation current must exist, which is determined by the dissociation velocity of the chlorine molecules. Besides, no linear dependence between the excess voltage and the logarithm of the cathode

Card 1/3

The Ionisation Kinetics of Molecular Chlorine

20-3-32/59

current is obtained. The amperage of the cathode current in case of given excess voltage cannot depend on the concentration of the chlorine ions $[Cl^-]$. For the potential of the electrode and for the excess voltage formulae are given. In case of validity of a certain assumption given here in detail a linear dependence must be valid between the logarithm of the current density and the potential (or the overvoltage). This conclusion is also proved by the experiment. The independence of the current density on $[Cl^-]$ in case of given potential of the electrode proves the irreversibility of the state of self-sustained ionisation. The results of the experiments fit well into the score of the theory, if the following is assumed: The process of the ionisation of Cl_2 passes the following two states: $Cl_2 + e \rightleftharpoons Cl_{adsorbed} + Cl^-$; $Cl_{adsorbed} + e \rightleftharpoons Cl^-$ apart from the state of the diffusion of Cl_2 . The first one of these both reactions is irreversible in case of sufficiently high excess voltage. There are 4 figures and 4 references, all of which are Slavic.

ASSOCIATION:

Chair for Electrochemistry of the State University imeni M. V. Lomonosov, Moscow (Kafedra elektrokhemii Moskovskogo gosudarstvennogo universiteta imeni M. V. Lomonosova)

Card 2/3

The Ionisation Kinetics of Molecular Chlorine

20-3-32/59

SUBMITTED: September 25, 1957

AVAILABLE: Library of Congress

Card 3/3

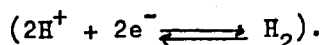
20-119-2-36/60

AUTHOR: Frumkin, A. N., Member, Academy of Sciences, USSR

TITLE: On the Stoichiometric Number of the Reaction of Electrochemical Hydrogen Desorption (O stekhiometricheskom chisle reaktsii elektrokhimicheskoy desorbtsii vodoroda)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol. 119, Nr 2
pp. 318 - 321 (USSR)

ABSTRACT: First several previous papers dealing with the same subject are mentioned, discussing the applicability of a criterion proposed by J. Horiuti and Yukasima (Reference 8) concerning the explanation of the mechanism and of the nature of the slow stage of the transition of hydrogen ions into molecular hydrogen



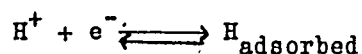
Card 1/4

At present usually the stoichiometric number ν which is equal to $2/\lambda$ is used as criterion. Here ν denotes a number

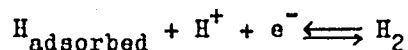
20-119-2-36/60

On the Stoichiometric Number of the Reaction of Electrochemical Hydrogen Desorption

characterizing the process. This number ν expresses how many times the slowest stage must be repeated in order to pass the whole process once. When the surface of the electrode is homogenous and when the displacement of H_{adsorbed} on the surface of the electrode is not connected with a noticeable activation energy the amounts of direct and inverse reaction velocities v_1 and v_2 of the stage discharge-ionization



and of the direct and inverse reaction velocities v_3 and v_4 of the stage of electrochemical desorption-adsorption



Card 2/4

can be represented by the here given equations, The further

20-119-2-36/60

On the Stoichiometric Number of the Reaction of Electrochemical Hydrogen Desorption

course of the calculation is followed step by step and the results are mentioned in detail:

$$\nu = 1 + 1/2\gamma = 1 + i_{OI}/2i_{OII}$$

Here i_{OI} denotes the exchange current in the stage discharge-ionization and i_{OII} denotes the exchange current in the stage desorption-adsorption. Only with $i_{OI} \ll i_{OII}$ $\nu = 1$ holds valid but with $i_{OI} \gg i_{OII}$ ν can become arbitrary great. According to the equations found here the existence of a considerable exchange current i_{OII} with small i_{OI} secures a great value of the total exchange current, but not a small polarizability of the electrode. The calculations carried out for ν do not furnish a correct idea on the values of ν given in references. The reasons for this are shortly

Card 3/4

20-119-2-36/60

On the Stoichiometric Number of the Reaction of Electrochemical Hydrogen Desorption

discussed. With $\gamma \ll 1$ the extrapolated amperage is not equal to the real amperage. On certain here given conditions the value of γ' determined from the extrapolated power of the exchange current is equal to unity. The same value for γ' is obtained when the anode part of the curve and not the cathode part is used for extrapolation. There are 13 references, 7 of which are Soviet.

SUBMITTED: December 24, 1957

Card 4/4

AUTHORS: Damaskin, B. B., Nikolayeva-Fedorovich, SOV/20-121-1-36/55
N.V., Frumkin, A. N., Member, Academy of Sciences, USSR

TITLE: On the Adsorption of the Ion Cs^+ on the Surface of a Mercury
Electrode (Ob adsorptsii iona Cs^+ na poverkhnosti rtutnogo
elektroda)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 121, Nr 1,
pp. 129 - 132 (USSR)

ABSTRACT: The authors performed their measurements at solutions of
sodium fluoride and cesium fluoride to avoid complications
in the investigation of the superequivalent (sverkhekvivalent-
noy) cation adsorption. The authors determined the differential
capacitance by means of an impedance bridge at a dropping-
mercury electrode in solutions of NaF and CsF of concentrations
of 0,9 N, 0,1 N, and 0,01 N as well as in solutions of NaJ
and CsJ. The data found are given in 2 diagrams. The capacitance
of the double layer in solutions of cesium fluoride is higher
than in solutions of sodium fluoride. Numerical data are given
as well. According to the obtained data a cesium cation is
more adsorbed on the mercury surface (on which a fluorine

Card 1/3

On the Adsorption of the Ion Cs^+ on the Surface of a Mercury Electrode SOV/20-121-1-36/55

is adsorbed) than a sodium cation. A conclusion on the superequivalent adsorption of Cs^+ can also be made by comparing the corresponding curves of the capacitance of the fluorides and iodides of sodium and cesium. These data on the super-equivalent adsorption of cesium were also proved by electrocapillary measurements in 0,1 N solutions of NaF, NaJ, CsF, and CsJ. An important fact is also the displacement of the maximum on the electrocapillary curve from -0,471 in the case of NaF to the value of -0,468 for CsF and from -0,815 for NaJ to -0,833 for CsJ. There are 3 figures, 1 table, and 9 references, 3 of which are Soviet.

SUBMITTED: May 8, 1958

Card 2/3

On the Adsorption of the Ion Cs^+ on the Surface of a
Mercury Electrode

SOV/20-121-1-36/55

1. Cesium ions--Adsorption
2. Mercury electrodes--Adsorptive properties

Card 3/3